HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Skagit Spring Chinook Fingerling Program
Species or Hatchery Stock:	Spring Chinook (Onchorynchus tshawytscha) Skagit River
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Skagit River Puget Sound
Date Submitted:	August 23, 2002
Date Last Updated:	August 21, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Marblemount Spring Chinook Fingerling Program

1.2) Species and population (or stock) under propagation, and ESA status.

Skagit River Spring Chinook (*Oncorhynchus tshawytscha*)

1.3) Responsible organization and individuals

Name (and title):	Chuck Phillips, Region 4 Fish Program Manager Chuck Lavier, Skagit Complex Manager	
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

1.4) Funding source, staffing level, and annual hatchery program operational costs.

Funding for this program is provided through the State General Fund.

1.5) Location(s) of hatchery and associated facilities.

Marblemount Hatchery: Cascade River (04.1411) RM 0.5 at confluence with Clark Creek (04.1421). The Cascade River is a tributary to the Skagit River (03.0176) at RM 78.

1.6) Type of program.

Integrated research

1.7) Purpose (Goal) of program.

Research (Monitoring & Evaluation of wild fingerling spring chinook)

The entire (250,000) Skagit spring chinook fingerling program are adipose-fin clipped/coded-wire tagged (Ad + CWT) with the purpose of marking fish with CWT's to better determine migration patterns, run timing, total survival, contribution to fisheries and straying to other watersheds. They serve as an index group for wild Skagit River fingerling spring chinook.

1.8) Justification for the program.

This program will be operated to provide for harvest opportunity while minimizing adverse effects on the listed fish. This will be accomplished in the following manner:

1. Hatchery fish will be released as smolts at a time to minimize or eliminate adverse interactions with natural-origin listed fish.

2. Hatchery fish will be coded-wire tagged/adipose-fin clipped to distinguish them from wild fish.

3. Only appropriate stocks will be propagated.

4. Hatchery fish will be propagated using appropriate fish culture methods and consistent with the Co-Managers Fish Health Policy, spawning and genetic guidelines and state and federal water quality standards.

1.9) List of program "Performance Standards".

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

Performance Standards and Indicators for Puget Sound **Integrated Research** Chinook programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Meet hatchery production goals	Number of juvenile fish released - **250,000**	Estimating number of fish planted (weighing / counting fish), monitoring proximity to hatchery production goals, number released recorded on hatchery divisions "plant reports", data available on WDFW data base. Future Brood Document (FBD).

Manage for adequate escapement	Hatchery and wild return rates - **3,000 natural-origin recruit spawners**	Monitoring hatchery/wild return rates through trapping (at the hatchery), surveys on the spawning grounds plus CWT data.
Minimize interactions with listed fish through proper broodstock management	Total number of broodstock collected - **500 adults**	Measure number of fish actually spawned and killed to meet egg take goal at the hatchery
	Sex ratios & age composition	Hatchery records and spawning guidelines.
	Timing of adult collection/spawning - **late April thru September**	Start trapping prior to historical start of the run, continue trapping throughout the run, dates and times are recorded on hatchery divisions "adult reports", data available on WDFW data base.
	Number of listed fish passed upstream - **all non-marked (listed) fish are returned to the river**	
	Hatchery stray rate **<4% inside GDU; dependent on acceptable risk profile <1% outside GDU**	Hatchery records. CWT data and spawning ground surveys
	Number wild fish used in broodstock - **none at this time**	Spawning records (hatchery "adult reports")
	Return timing of hatchery / wild adults **late April thru September**	Hatchery records and spawning guidelines.
	Adherence to spawning guidelines **1:1 with use of secondary male**	

Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	Future Brood Document and hatchery records
	Outmigration timing of listed fish / hatchery fish **early May/June release**	Hatchery records and historical natural out-migrant data (Seiler's data)
	Size and time of release **85 fpp/June release**	Future Brood Document and hatchery records
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines
	Monitor divergence of hatchery fish morphology and behavior characteristics	Spawner surveys
	HOR spawners	
Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy Fish Health Exam Reports
	Fish pathologists will diagnose fish health problems and minimize their impact	
	Vaccines will be administered when appropriate to protect fish health	

	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES records

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

500 adults (to meet fingerling and yearling program; and to accommodate re-instatement of Tulalip tribal net pen program needs).

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. *(Use standardized life stage definitions by species presented in Attachment 2).*

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling	Clark Creek (04.1421)	250,000
Yearling		

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Collective (natural) escapement goal (Upper Cascade, Sauk and Suiattle) is 3,000, but levels in recent years have been less than a 1,000. Smolt to adult survival rates for broodyears 1993 through 1997 have averaged approximately .49% (fingerling program). Escapement levels back to the hatchery rack for brood years 1995 through 2001 were 1,080, 960, 1,138, 1,126, 3,159, 1,102 and 1,567, respectively.

1.13) Date program started (years in operation), or is expected to start.

1978

1.14) Expected duration of program.

Ongoing

1.15) Watersheds targeted by program.

Skagit River (03.0176).

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

None.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

- Identify the ESA-listed population(s) that will be directly affected by the program.

Upper Cascade Spring Chinook

There are three stocks of native spring chinook in the Skagit River: Upper Sauk, Suiattle and Upper Cascade. The Upper Sauk was considered healthy (SASSI, 1992). However, in recent years a downward trend has been observed. The Suiattle stock remains depressed. The Upper Cascade is identified as unknown. Both the Suiattle and Cascade stocks have stabilized at low levels. Collectively the escapement goal for Skagit spring chinook is 3,000 spawners. Actual escapement has been 1,000 or less in recent years. Suiattle spring chinook spawn in the Suiattle mainstem in the proximity of various tributaries including: Big, Tenas, Buck, Straight, Lime, Downey, and Sulphur Creeks. Spawning in the glacial mainstem has been observed and while not quantified because of poor visibility, appears to be limited. Suiattle spring chinook are the earliest spawners in the Skagit basin, and perhaps the earliest chinook spawners in Puget Sound. Spawning begins in mid-July, peaks in the second week of August, and ends by mid-September. The two other spring chinook stocks, the Upper Sauk and Upper Cascade, have a similar spawn timing which begins in early August, peaks around the last week of August to first week of September and is completed by the end of September. Upper Sauk spring chinook spawn in the mainstem Sauk from river mile 31.9 to 41.2; in the South Fork Sauk up to river mile 4; and in the Whitechuck River up to river mile 10.4. Upper Cascade spring chinook spawn in the Cascade River from river mile 7.8-18.6 and in Found and Kindy Creeks.

Escapement of Skagit Spring Chinook

YEAR	Cascade	Up Sauk	Suaittle	Total
1988	133	870	740	1743
1989	218	668	514	1400
1990	269	557	685	1511
1991	135	747	354	1236
1992	205	580	201	986
1993	168	323	292	783
1994	173	130	167	470
1995	225	190	440	855
1996	208	408	435	1051
1997	308	305	428	1041
1998	323	290	473	1086
1999	83	180	208	471

Source: WDFW data

-Identify the ESA-listed population(s) that may be incidentally affected by the program.

Lower Skagit/MS Trib Fall Chinook, Upper Skagit/MS Trib Summer Chinook, Suiattle Spring Chinook, Lower Sauk Summer Chinook, Upper Sauk Spring Chinook, Stillaguamish Fall Chinook, Stillaguamish Summer Chinook, Bull Trout/Dolly Varden.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

-Describe the status of the listed natural population(s) relative to critical and viable population thresholds

Critical and viable population threshholds under ESA have not been determined, however, the SASSI report (WDFW) determined this population (Skagit Spring Chinook), depending on the stock, to range from healthy to depressed to unknown (see section 2.2.1)

-Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

See table on next page.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

SKAGIT CHINOOK

Brood Year	Est. Females	Potential Eggs* (Millions)	Total Smolts	Survival to Migration
1989	3274	14.7	963,930	6.5%
1990	8468	38.1	233,603	0.6%
1991	2923	13.2	1,777,330	13.5%
1992	3598	16.2	2,142,078	13.2%
1993	2793	12.6	1,436,530	11.4%
1994	2847	12.8	1,310,448	10.2%
1995	3465	15.6	414,691	2.7%

* at 4,500/female

Range of Natural Origin Recruit per Spawner (1992 to 1999) = .356 to 2.619 : 1 Average is 1.132 spawner / recruit.

Source: WDFW trapping data

Ratio of naturally produced smolts to hatchery-reared smolts for 1994 & 1995 are 5.2:1 and 1.2:1, respectively (refer to Table 10.3 for number of hatchery-reared smolts for 1994 & 1995)

-Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Unknown

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take

-Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Unclipped chinook volunteer into the Marblemount trap and are quickly returned to the Cascade River to continue their migration. They are of unknown stock or origin and presumed to be wild.

The Jordan Creek Intake, one of four water supplies for the hatchery, may pose a low to moderate risk of take to listed fish by seasonally delaying passage or restricting access to Jordan Creek. The intake is not in operation from October through April and salmonids have upstream passage during that time.

Adult salmonids are not passed upstream into Clarks Creek, an additional hatchery water supply.

Wild adult chinook may on occasion volunteer into the off-line hatchery trap. They are netted and transported, by tank truck, to the Cascade River where they are released. The take risk is deemed low due to the small numbers expected, usually only a few fish.

-Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Unknown

-Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

See "take" table at end of HGMP.

-Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

This hatchery, as well as other WDFW hatcheries within the Puget Sound Chinook ESU, operates under U.S v Washington and the Puget Sound Salmon Management Plan. This co-management process requires that both the State of Washington and the relevant Puget Sound Tribe(s) develop *Equilibrium Broodstock Programs* and to enter into agreement the function, purpose and release strategies of all hatchery programs.

In addition, WDFW hatchery programs in Puget Sound must adhere to a number of guidelines, policies and pemit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW hatchery operations:

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagrated salmon (Hershberger and Iwamoto 1981).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations (Seidel 1983).

Stock Transfer Guidelines. This document provides guidance in detemining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDFW 1991).

Fish Health Policy of the Co-managers of Washington State. This policy designates zones limiting the spread of fish pathogens between watersheds, thereby further limiting the transfer of eggs and fish in Puget Sound that are not indigenous to the regions (WDFW, NWIFC, WSFWS 1998).

National pollutant Discharge Elimination System Permit Requirements This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

Although not directly related to hatchery programs, the North of Falcon Process should be mentioned as an avenue for developing harvest regulations. This is an annual process that involves co-managers and stakeholders, and a process that is conducted in concert with the Pacific Fisheries Management Council. The primary focus is to develop salmon fishing regulations for commercial and recreational fisheries in marine and freshwater areas. As a result, WDFW and the Skagit Coop each year enter into an agreement, which is identified as the Skagit Memorandum of Understanding. The principle purpose of the memorandum is to set forth mutually agreed upon steps and conditions under which all Washington fisheries on Skagit stocks will be managed for that particular year, with the primary management objective of providing consistent and equitable management of inside and outside treaty and non-treaty fisheries. A second objective is to outline steps to plan for and attain cooperative, joint management of Skagit System fisheries in future years.

3.3) Relationship to harvest objectives.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Although there is no directed harvest in the terminal area, there are fisheries that benefit from the program. Percent contribution of the total catch to the Washington fisheries averaged ~ 8.5% while the contribution to the Canadian catch averaged ~ 35%. These data is from tag information from brood years 86, 93, 94 and 95.

3.4) Relationship to habitat protection and recovery strategies.

All chinook stocks are likely affected by the estuary; the estuary is 30% its historical size because of the dikes. Biologists believe the estuary is a limiting factor for all chinook production (Hatchery Scientific Review Group (HSRG), Skagit Briefing Book, 2002)

3.5) Ecological interactions.

Predation of other wild fish is considered low (Risk Assessment, WDFW). They are released at a similar size and after most of their wild counterparts have left the system. Competition risks are low, given results of Seiler et al.'s 2000 work on natural chinook emigration size/timing and timing of/size at release of hatchery fingerlings. Stray rates of Marblemount fingerling spring chinook into other watersheds within the same GDU is low as computed via Risk Assessment (.21%).

No straying has been seen into other GDU's.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Marblemount hatchery has four water sources available most of the year. Well water provided by five wells produces about 1,000 gallons per minute (gpm) per pump. This water is used for the hatchery and up to six 10' X 100' ponds. Clark Creek, which is spring fed and provides up to 2,500 gpm, is used for starting fish because of its quality and water temperature (40-55 degrees Fahrenheit). Clark Creek also flows through the adult pond and is used to attract and acclimate all fish released and coming back to the hatchery. The bulk of the water is supplied from the Cascade River. Four pumps receive water from a settling pond. Each pumps 2,500 gpm. Jordan Creek is the fourth water source that is used for only about five months out the year. High winter flows force this intake to be shut down. Jordan Creek can provide about 8000 gpm. Temperatures can range from a low of 38 degrees Fahrenheit to a high of 65.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

At Marblemount, all intake screens are 1" x .125" mesh and are believed to comply with state and federal guidelines. No chinook are passed above Clark Creek. Jordan Creek is utilized only from May through September. All discharge meet or exceed NPDES requirements.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Adult fish return to the Clark Creek trap where they enter through a four step ladder and a V trap. From there, they are held in 10' X 200' holding section.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

A 300 gallon fish tank on a flatbed truck is used (15 fish per load). Fish are carried from the adult pond to the transport truck in rubber tubes. Fish are then transported to holding ponds (500 feet) until spawning.

5.3) Broodstock holding and spawning facilities.

Adults are held and spawned in one of three 10' X 100' X 3' concrete raceways.

5.4) Incubation facilities.

Eggs are incubated in isolation buckets one female per bucket. Once eyed, the eggs are put into vertical incubators @ 5,000 eggs per tray and 3.5 gpm using well water.

5.5) Rearing facilities.

Fish are reared in 10' X 100' X 3' raceways. These raceways are supplied by well water and/or surface water.

5.6) Acclimation/release facilities.

All fish released on station are acclimated on Clark Creek water prior to release.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

None.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

At least one hatchery crew members is at the facility and on stand-by status at all times. All rearing vessels have low water flow alarms. All tools are disinfected prior to use on each pond.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Adult spring chinook returning to the Marblemount Hatchery.

6.2) Supporting information.

6.2.1) History.

Marblemount Hatchery spring chinook stock appear to have originated from local Skagit stock. References to Skagit spring chinook were found in planting records in 1952. These fish may have originated from the Cascade River. Plants of spring chinook were discontinued until the 1974 brood when Buck Creek stock was introduced.. From 1976-1982 other tributaries of the Suiattle were trapped and broodstock collected for the hatchery. In 1981, the first returns of Buck Creek stock returned to the hatchery. These progeny, along with the other tributary broods were combined and released.

6.2.2) Annual size.

500 adults.

6.2.3) Past and proposed level of natural fish in broodstock.

Currently use only hatchery-origin broodstock. Use of natural broodstock would necessitate going out in river to collect (mine) wild fish, but maybe higher risk than continuing to use hatchery-origin broodstock.

6.2.4) Genetic or ecological differences.

None known.

6.2.5) Reasons for choosing.

Indigenous stock

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

All hatchery fish are coded-wire tagged/adipose-fin clipped for identification. Only hatchery-origin fish are used for spawning at this facility (see section 6.2.3).

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults.

7.2) Collection or sampling design.

WDFW shall collect broodstock from adults returning to the Marblemount Hatchery prior to August 15. Only coded-wire tagged adults originating from the Marblemount Hatchery Spring Chinook program shall be used for broodstock. Marked adults entering the trap in excess of broodstock requirements shall be transported and released into Baker Lake where they may spawn in its' tributaries. Unmarked adults shall be returned to the Cascade River.

7.3) Identity.

All hatchery fish have been coded-wire tagged/adipose-fin clipped for identification. Unclipped fish not bearing a CWT are assumed to be wild and passed upstream to spawn naturally.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

A minimum of 500 adults need to be retained for broodstock (to meet fingerling, yearling, and possible net pen program needs).

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1988	7	10	1	22,000	
1989	120	183	15	474,000	
1990	111	197	3	481,000	
1991	188	198	10	843,000	
1992	98	110	4	379,000	
1993	400	1,174	14	1,549,000	
1994	239	250	10	843,000	
1995	196	338	21	844,500	
1996	232	235	8	1,037,989	
1997	170	193		798,800	
1998	145	142	1	563,400	
1999	227	227		1,013,340	
2000	166	172		774,000	
2001	132	132		607,300	

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Marked adults entering the trap in excess of broodstock requirements shall be transported and released into Baker Lake. Unmarked adults shall be returned to the Cascade River.

7.6) Fish transportation and holding methods.

Adults for spawning are transported from trap to holding pond (500 feet) in a 300 gallon tank. At time of transfer fish receive an injection of erythromycin at 20 mg/kg of fish. Fish are injected again after 3 weeks. Fish are loaded about 15 fish per load and are in the tank for about 20 minutes. Adults are held in well water treated with formalin every other day at 1:10,000. Well water is used to hold adults. Two-thirds of the pond (10' X 100' X 3') is covered with a tarp.

7.7) Describe fish health maintenance and sanitation procedures applied.

Adults are treated with a formalin drip at 1:10,000 every other day in the holding pond. All tools are disinfected between each use. Females receive an injection of erythromycin at 20 mg/kg of fish. Fish are re-injected after 3 weeks. Any loss is removed daily and buried on station. No treated fish will be used for anything but spawning. All spawned fish will be buried on station.

7.8) Disposition of carcasses.

Carcasses, not treated for BKD, are used for nutrient enhancement or buried on station. All spawned fish will be buried on station.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Coded-wire tagged/adipose-fin clipped adults and adults containing just a CWT will be used for the broodstock program (see Section 6.2.3).

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

All fish are selected and spawned randomly throughout the entire run.

8.2) Males.

A primary and secondary male (to one female) are used in the mating scheme. Jacks return in such low numbers that none are utilized in the mating scheme.

8.3) Fertilization.

Primary male sperm is mixed with eggs (from one female) and allowed to set for 30-60 seconds. The secondary male is added and also given 30-60 seconds. Water is added to activate sperm. Eggs are then poured into a colander and drained. The colander is then dipped and drained twice in a iodophor solution of 100 ppm. Eggs are then placed into an incubator and water hardened for 1 hour in an iodophor solution of 100 ppm.

8.4) Cryopreserved gametes.

NA

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

Only hatchery-origin fish, randomly selected throughout the entire run, are used for broodstock.

SECTION 9. INCUBATION AND REARING -

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

The egg take to meet the fingerling program needs is 250,000. The eggs will be sorted by level of Bacterial Kidney Disease (BKD) in the parent fish. Only eggs from parents exhibiting the lowest BKD levels are retained. All others are destroyed The survival rates to eye-up average 93% with a high of 96% and a low of 86%. Average loss from eyed egg to swim-up fry is 4%.

9.1.2) Cause for, and disposition of surplus egg takes.

Eggs in excess of need are taken to allow for BKD losses. Eggs detected with high BKD levels are destroyed at the eyed egg stage.

9.1.3) Loading densities applied during incubation.

Eggs from one female are loaded into an isolation bucket with a flow of 1.5 gpm. After eyeing up, dead eggs are removed and the remaining eggs are incubated in vertical Heath Trays at 5,000 per tray with a flow of 3.5 gpm.

9.1.4) Incubation conditions.

All eggs are incubated on well water at 47 degrees. Dissolved oxygen (DO) readings are 12 ppm coming in to the incubators and 9.5 ppm going out.

9.1.5) Ponding.

Fry are ponded at a KD (condition factor) between 1.75-1.97 and at 95-100% buttoned up. Mean length is 40.325 mm and a mean weight of .498g/f.. Fry are ponded into starter troughs in the hatchery building. Fry from the same egg take date are ponded together.

9.1.6) Fish health maintenance and monitoring.

Egg are picked prior to hatching at a strong eyed stage. Eggs are treated every other day with formalin at 1,667 ppm until just prior to hatching. Fry loss is picked at time of ponding. Loss is picked daily from the ponds. Fry are checked every 3 weeks by area fish pathologist.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

All eggs will be incubated on well water. Fry are checked every 3 weeks by fish pathologist. All fish are from marked hatchery-origin adults.

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

9.2.2) Density and loading criteria (goals and actual levels).

Maximum loadings for this stock is 3 lbs/gpm with a density index of 0.20. Actual levels reached are 2.3 lbs/gpm and a density index of 0.13.

9.2.3) Fish rearing conditions

All fish are started in the hatchery building on well water at 47 degrees and held indoors as long as possible. When fish are about 400-800 fish per pound (fpp), they are moved to outside rearing ponds (10' X 100' X 3'). Temperatures range between 40-55 degrees Fahrenheit and the DO's range from 8 ppm - 12 ppm.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Condition factor ranges between 1.101-1.285.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Not available.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

This stock is started on BIO-STARTER up to 400 fish per pound (fpp). At this size they are switched to BIO-MOIST FEED. Fish are fed every day, 2-8 times per day. The % of feed to be fed will range from 2 % to 3.5 % B.W./day. Percent body weight fed will vary so that all fish will reach 200 fpp by late April. Overall conversion 1.2:1.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

All tools are disinfected between uses. All ponds are disinfected between uses. All loss is removed daily. Fish are checked every 3 weeks by fish pathologist. Treatments are made as prescribed by fish pathologist and the Co-Managers Fish Health Manual.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

NA

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

None.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

All fish under propagation are hatchery-origin fish. Survival is maximized by rearing fish in well water.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling	250,000	85	June 1 - 15	Clark Creek
Yearling				

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Clark Cr. (04.1421)
Release point: Pond outlet 100 yards above mouth of Clark Cr.
Major watershed: Skagit River
Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994			793,000	400 fpp	249,757	65 fpp		
1995					261,581 95,175	63 fpp 41 fpp		
1996					252,448	71 fpp		
1997					130,500	80 fpp		
1998					272,429	61 fpp		
1999					246,663	75 fpp		
2000					262,620	83 fpp		
2001					270,079	82 fpp		
Average					226,806	69 fpp		

10.4) Actual dates of release and description of release protocols.

All fish released from the hatchery are imprinted on Clark Creek water for three weeks prior to release. All fish are volitionally released. This can take up to 20 days. Presently, a fish counter is used during release time. After most of the fish have left the pond it is drawn down to allow more to migrate out.

10.5) Fish transportation procedures, if applicable.

NA

10.6) Acclimation procedures.

All fish are acclimated on Clark Creek for three weeks prior to release.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

All of the fingerling spring chinook are adipose- fin clipped/ coded-wire tagged (Ad + CWT). All returning adults are 100% electronically sampled to allow separation during spawning of spring, summer and fall chinook.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

None.

10.9) Fish health certification procedures applied pre-release.

All fish are checked by a area fish pathologist prior to release.

10.10) Emergency release procedures in response to flooding or water system failure.

NA

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

All fish released from the hatchery are imprinted on Clark Creek for three weeks prior to release. This is done to ensure a strong homing to the hatchery thus reducing straying. Also, the fish released are similar in size to the indigenous stocks in the area so predation and competition is a low risk and are entering river after most of their wild counterparts have left.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

Note: See section 1.10 for Monitoring and Evaluation. The purpose of a monitoring program is to identify and evaluate the benefits and risks which may derive from the hatchery program. The monitoring program is designed to answer questions of whether the hatchery is providing the benefits intended, while also minimizing or eliminating the risks inherent in the program. A key tool in any monitoring program is having a mechanism to identify each hatchery production group.

Each production group shall be identified with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available, to allow for evaluation of each particular rearing and/or release strategy. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW shall monitor the Chinook salmon escapement into the target and non-target Chinook populations to estimate the number of tagged, un-tagged and marked fish escaping into the river each year and the stray rates of hatchery Chinook into the rivers.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

WDFW shall tag all spring chinook fingerling releases from the hatchery each year to allow monitoring and evaluation of juvenile out-migrants and adult returns. Also, to maintain separation during hatchery spawning between spring, summer and fall chinook stocks.

WDFW shall also monitor chinook escapement (see Section 11.1.2 below) to the Skagit River sites to estimate the number of tagged, untagged and marked fish escaping to the river each year. This monitoring will allow for assessment of the status of the target population and the success of the program in achieving restoration objectives. Also smolt trapping and estuarine surveys allow for more assessment of the status of the target population.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Staffing hours to conduct spawning grounds surveys and biological assessment is limited by funding. Funding and resources are currently committed to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, August 23, 2002).

WDFW and the tribes shall review the results from the spring, summer and fall exploitation rate indicator stock programs to determine if all programs are required.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring and evaluation will be undertaken in a manner which does not result in an unauthorized take of listed chinook.

SECTION 12. RESEARCH

12.1) Objective or purpose.

12.2) Cooperating and funding agencies.

12.3) Principle investigator or project supervisor and staff.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

12.6) Dates or time period in which research activity occurs.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8) Expected type and effects of take and potential for injury or mortality.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

12.10) Alternative methods to achieve project objectives.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

SECTION 13. ATTACHMENTS AND CITATIONS

Hatchery Scientific Review Group (HSRG), Skagit Briefing Book, 2002

Seiler, D., S. Neuhauser, and L. Kishimoto. 2001. 2000 Skagit River wild 0+ chinook production evaluation. Annual Project Report. Science Division, Washington Department of Fish and Wildlife. Olympia, Wa. 45 p.

Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife, Olympia.

Washington Department of Fish and Wildlife. 1996. Fish Health Manual. Hatcheries Program, Fish Health Division, Washington Department of Fish and Wildlife, Olympia.

Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, 2002, "Puget Sound Chinook Salmon Hatcheries, Resource Management Plan", a component of Comprehensive Chinook Salmon Management Plan, August 23, 2002. 103 pages.

Washington Department of Fish and Wildlife and Washington Treaty Indian Tribes. 1998. Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Olympia

Washington Department of Fish and Wildlife and Washington Treaty Indian Tribes. 2001. Current Brood Document.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population:Puget Sound Chinook Activity:Fingerling Spring Chinook Program				
Location of hatchery activity: Skagit R. Dates of activity: July to June Hatchery program operator: WDFW				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)			200*	
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		Unknown	20**	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Note* These fish volunteer into the off-river trap at Marblemount.
** none knowingly, estimated at 1% of total hatchery returns.